

46. To “hover” above Earth ( $M_E = 5.98 \times 10^{24}$  kg) means that it has a period of 24 hours (86400 s). By Kepler’s law of periods,

$$(86400)^2 = \left( \frac{4\pi^2}{GM_E} \right) r^3 \Rightarrow r = 4.225 \times 10^7 \text{ m.}$$

Its altitude is therefore  $r - R_E$  (where  $R_E = 6.37 \times 10^6$  m) which yields  $3.58 \times 10^7$  m.